history of atomic models

http://highered.mheducation.com/olcweb/cgi/pluginpop.cgi?it=swf::800::600::/sites/dl/free/0072482621/59229/Bohr_Nav.swf::The%20Bohr%20Atom

Review Thermal

Intro to Atomic and Nuclear Physics

Thermal - sum of kinetic and potential energy of the particles (atoms/molecules) that make up an object.

Temperature - the average kinetic energy of the particles that make up an object. How hot or cold something is.

Kelvin to Celcius add 273ºC
zero Kelvin is -273ºC and absolute zero - no kinetic energy in the particles.

Heat - energy flowing due to the difference in temperature.

the heat can cause a change of state or a change in

temperature.
Q=mH   H is latent heat find on tables
Q=mcΔT for changes in temperature
c is specific heat capacity

Laws of Thermodynamics
Zero - heat flows from hot to cold
First - energy is conserved
Second - Entropy (randomness) increases

p255 Q16

a) Solidifying releases heat $Q = mH_f$

$$= 0.175\,kg\left(2.04\times10^4 \frac{J}{kg}\right)$$

$$= 3570\,J$$

$$Q = mc\Delta T$$

$$\Delta T = \frac{35070\,J}{0.055\,kg\left(4180 \frac{J}{kg\,^\circ C}\right)}$$

$$= 16\,^\circ C$$

$$T_f = 16^\circ C + 20^\circ C$$
$$= \boxed{36^\circ C}$$

b) $-Q_{lead} = Q_w$

$$-0.175\,kg\left(130\,\frac{J}{kg^\circ C}\right)(T_E - 327^\circ C) = 0.05\,kg\left(4180\,\frac{J}{kg^\circ C}\right)(T_E - 36^\circ C)$$

$$mH - mc\Delta T = mc\Delta T$$

$$-22.75\,T_E + 7439.25 = \cancel{209}\,229.9\,T_E - \cancel{7524}\;-8276.4$$

$$\cancel{14\,963.25 = 231.75\,T_E}$$

$$15\,715.65 = 252.65\,T_E$$

$\boxed{T_F = 62^\circ C}$

p262 Review Problems 2, 4, 9, 18, 22, 25

Good topics:2-4 March 6, 8
Dark Energy
Dark Matter
Measuring Radiation
Harmful Effects of Radiation
Biological Uses of Radiation
The Advantages of Using Nuclear Energy
The Disadvantages of Using Nuclear Energy
Fission Reactor types
Nuclear Weapons
Fusion Reactors types
Particle Accelerators (Triumph at UBC or CERN or pick another one)
The Manhattan Project
Nuclear Fallout
Radioactive Wastes
Neutrinos
Chernobyl
Fukushima
Standard Model-quarks and leptons
Feynman Diagrams
Famous physicists and their discoveries: (Richard Feynman, Einstein,…)
Superconductors
Semiconductors and diodes
Black Holes(focus on relativity)
Negative Refraction
SuperNova Research (at Triumph?)
String Theory vs Quantum Gravity
Heisenburg Uncertainty Principle
Heisenburg's role in Second World War
Schrödinger Equation
Nobel Prizes in Physics

Irradiated foods
Physics in Movies
Physics in the News (http://physicsweb.org/)
Higgs Boson
Other topics – run by Mr. Klaassen first

Review Thermal

Thermal Energy - The **sum** of kinetic and potential energies of the particles that make up an object.

Temperature - How hot or cold something is. The **average** kinetic energy of the particles that make up an object.

Eg if you have 1cup of boiling water and add another cup, how has the

a) thermal energy changed? - double
b) temperature changed? - same

Kelvin to Celsius add 273ºC
absolute zero - -273ºC , particles have zero kinetic energy

Heat - Energy that flows as a result of a difference in temperature.
$Q=mc\Delta T$ for changes in temperature
$Q=mH$ for changes in state

c is specific heat capacity, in J/kgºC
H is latent heat of fusion or vapourization in J/kg

heat lost by one object = heat gained by another
$-Q_a=Q_b$

Laws of Thermodynamics
Zeroith - heat flows from hot to cold
First - conservation of energy - work and heat change the thermal energy.
Second - Entropy increases unless work is done.

Q16
175g of molten lead at 327ºC is added to 55g of water at 20ºC

a) what is the temperature of the water when the lead has just solidified (no change in temperature of the lead)
b) what is the equilibrium temperature of the water/lead system?

a) when the lead solidifies, it releases energy based on the heat of fusion.

$Q=mH_f = 0.175 \times 20400 = 3570.0$ J
$Q=mc\Delta T = 3570 = 0.055\text{kg}(4180\text{J/kg}^\circ\text{C})\Delta T$

$\Delta T = 3570/(0.055 \times 4180) = 15.5285$
$= T_f - T_i$
$T_f = 15.52+20=35.52 \boxed{=36^\circ\text{C}}$

$-Q_{lead}=Q_{water}$

$-0.175x130(T_E-327) = 0.055x4180(T_E - 36)$

or alternate solution:

$0.175x20400-0.175x130(T_E-327) =$
$0.055x4180(T_E - 20)$

$-0.175x130(T_E-327) = 0.055x4180(T_E - 36)$

0.175x130=22.75
22.75x327=7,439.25
0.055x4180=229.9
229.9x36=8,276.4
$-22.75T_E +7,439.25 = 229.9T_E - 8,276.4$
7,439.25+8,276.4 = 15,715.65
229.9+22.75=252.65
$252.65T_E = 15,715.65$
$T_E = 15,715.65/252.65=62.2032$

$\boxed{T_E=62^oC}$

p262 problems 2,4,9,18,22,25